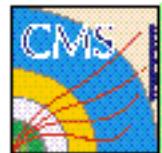


This procedure tested within cmsim and MC tracks gave promising results - improved jet resolution

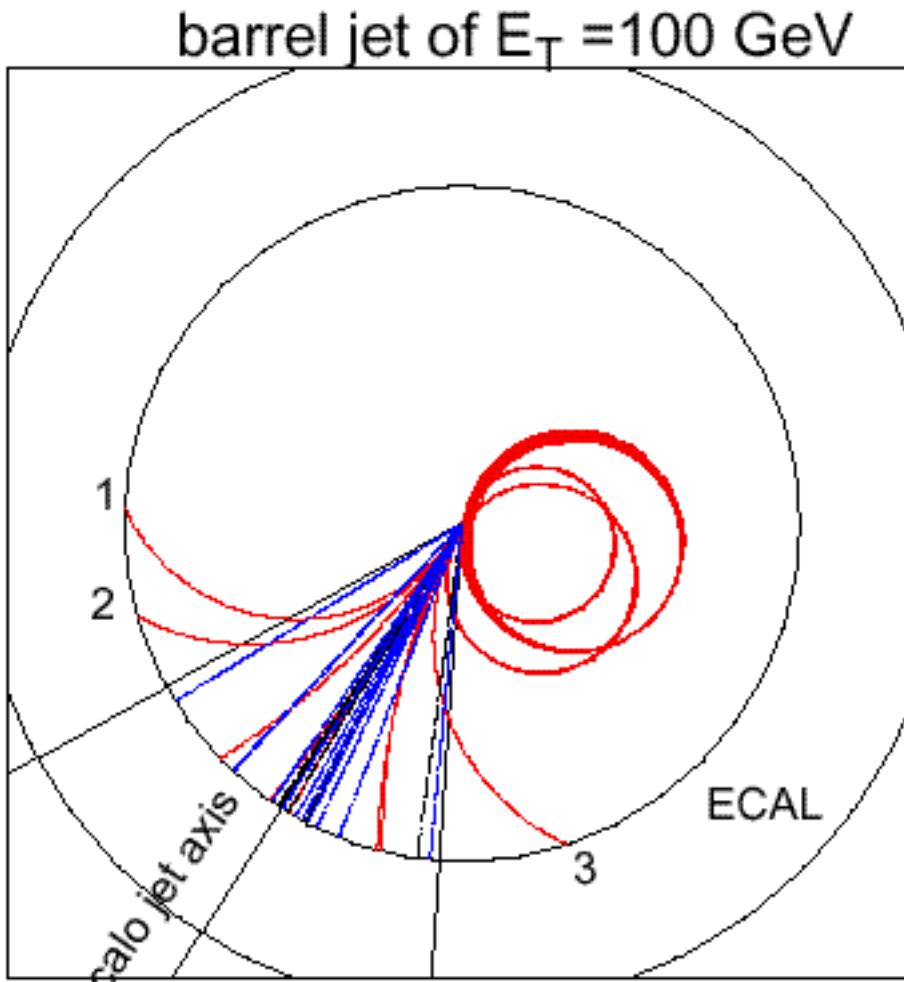


**Step 1 : use tracks of the jet with impact in calo out of the reco cone (due to 4T field)**

$$E_T \text{ jet} = E_T \text{ jet}^{\text{calo}} + p_T^{\text{trks}},$$

where  $p_T^{\text{trks}}$  is a sum  $p_T$  of tracks of the jet with impact in ecal out of the reconstruction cone due to deflection in 4T field

in fig. it is tracks 1,2 & 3.

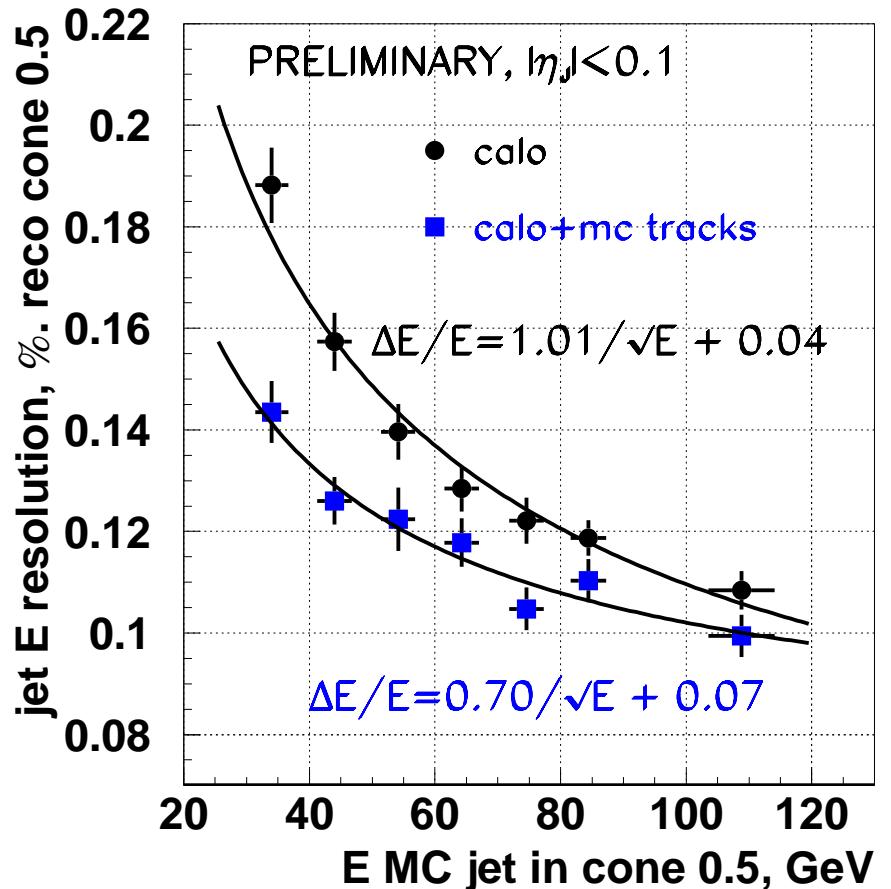


This time it's tested with ORCA and reco tracks

# “ideal world” of the previous simulation

- no reco tracks
- no HCAL noise
- no FSR, no pile up

just isolated bunch of particles  
(from 2-jet events) selected in cone  
0.5 around the leading track is passed  
through cmsim ; no tracks coming  
outside the cone to the calo reco cone



Since in the “ideal world” results were good (see plot)  
we move towards “realistic world” of ORCA

# “realistic world” of ORCA

- qcd\_50\_80 bin at  $L=2 \times 10^{32} \text{cm}^{-2}\text{s}^{-1}$  fully digitized (tracker from cms120)

1. reconstruct calo jets with iterative cone 0.5 and take one highest  $E_t$  jet

2. define MC jet as MC stable particles in cone 0.5 around jet axis

$$E_t J^{\text{MC}} = E_J^{\text{MC}} \sin(\theta_J), \text{ where } E_J^{\text{MC}} = \sum E_p^i, \\ \sin(\theta_J) = \sqrt{(\sum p_x^i)^2 + (\sum p_y^i)^2} / |\vec{p}_J|.$$

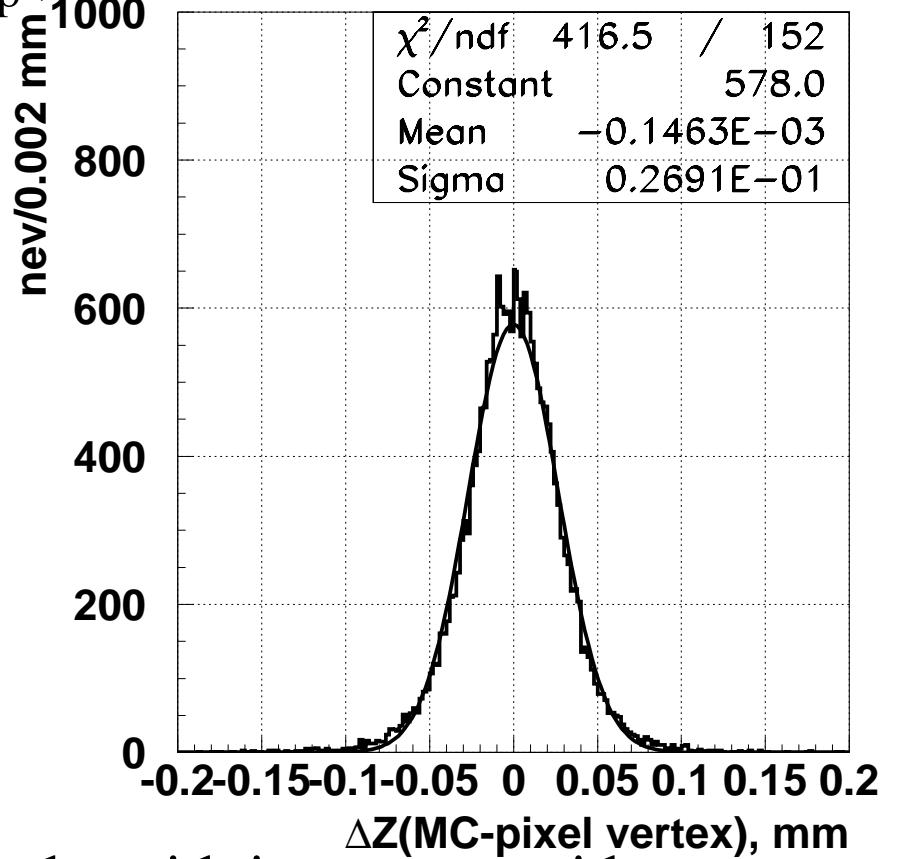
3. reconstruct all “pixel lines” and vertices  
and define signal vertex (SV) as vertex  
with max  $\sum |p_t|$  (see right plot).

Algorithm by D. Kotlinski. very fast !

We can use it at L2 for jet direction.

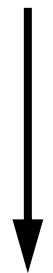
4. use “pixel lines” from SV and within  
cone 0.5 around jet direction as seeds  
for track finder

5. add to jet energy the momenta of reco tracks with impacts outside reco cone  
6. recalculate  $E_t^J$  from new  $E^{\text{calo+trk}}_J$  and  $\theta_J$  from  $E^{\text{calo}}_J_{x,y,z}$  and  $p^{\text{reco trk}}_{x,y,z}$

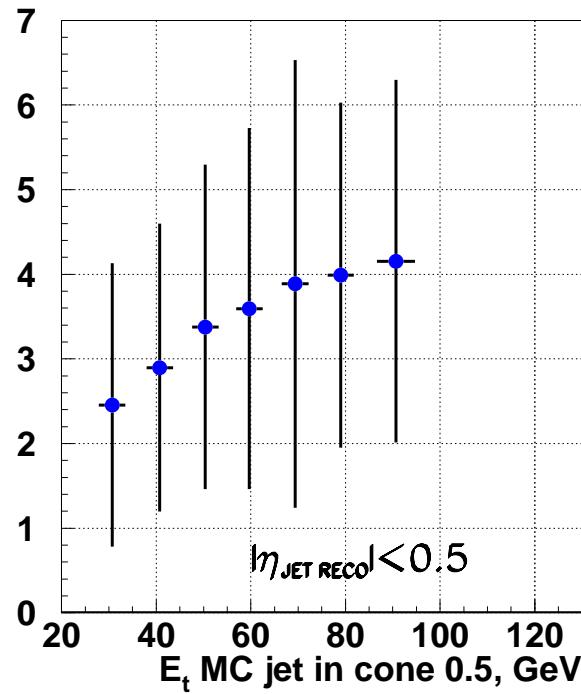


# MC particles inside jet reco cone (MC jet particles)

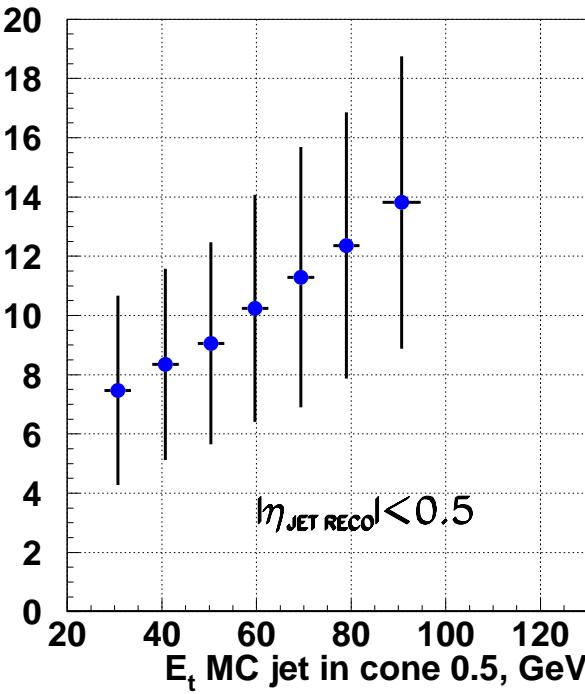
$\langle p_t^{\text{ch}} \rangle$



$\text{MC} \langle p_t^{\text{ch}} \rangle, \text{GeV}$



$\text{MC} \langle n^{\text{ch}} \rangle$



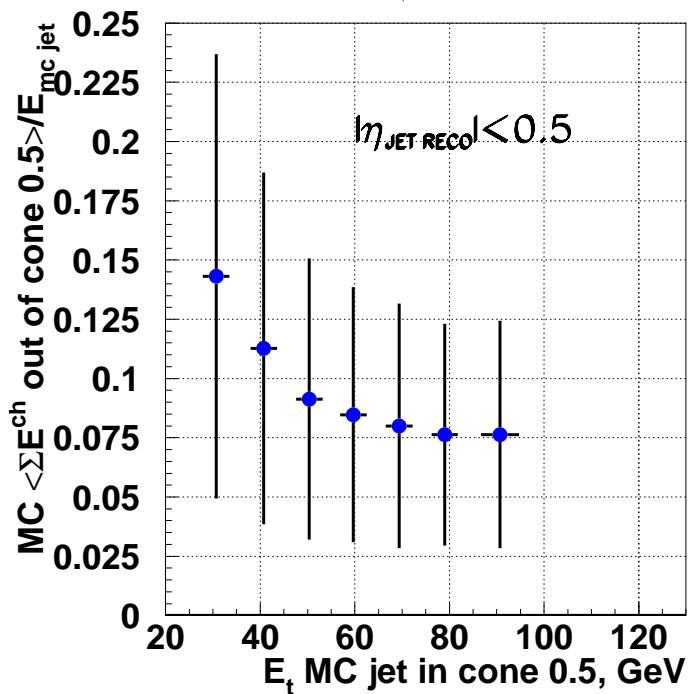
$\langle n^{\text{ch}} \rangle$



energy fraction of  
charged particles with  
impacts in calo outside  
of reco cone 0.5



$\text{MC} \langle \sum E^{\text{ch}} \text{ out of cone } 0.5 \rangle / E_{\text{mc jet}}$



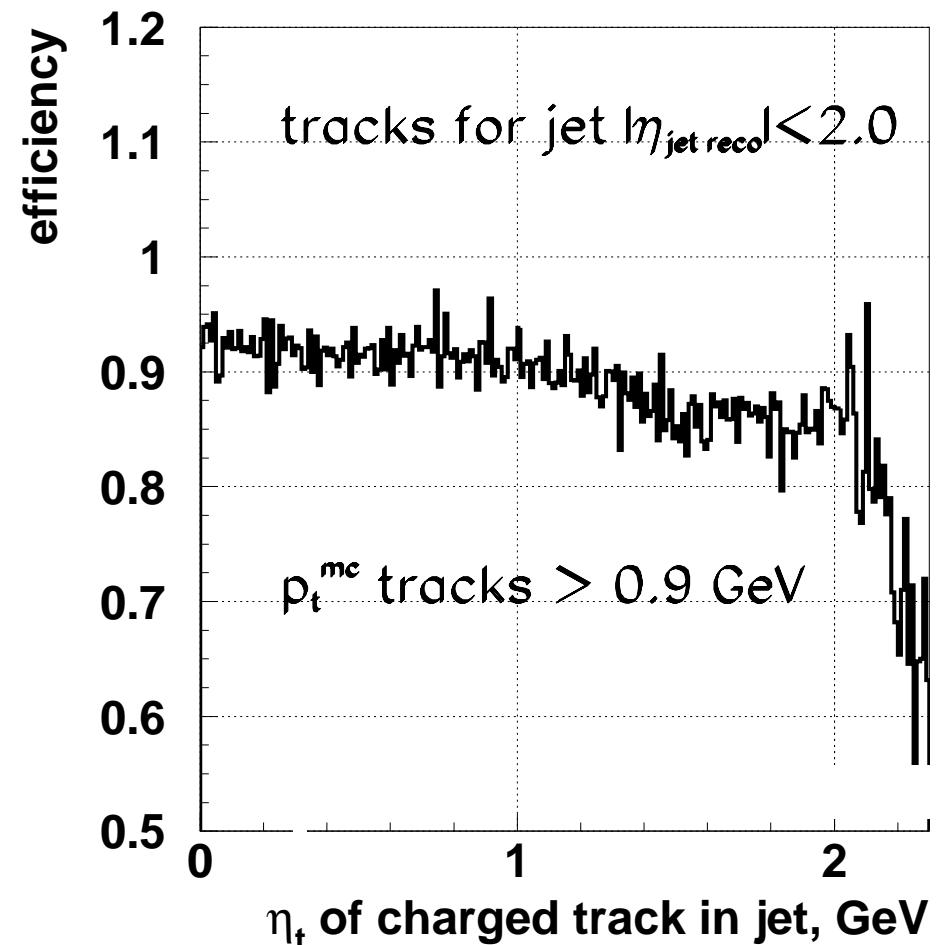
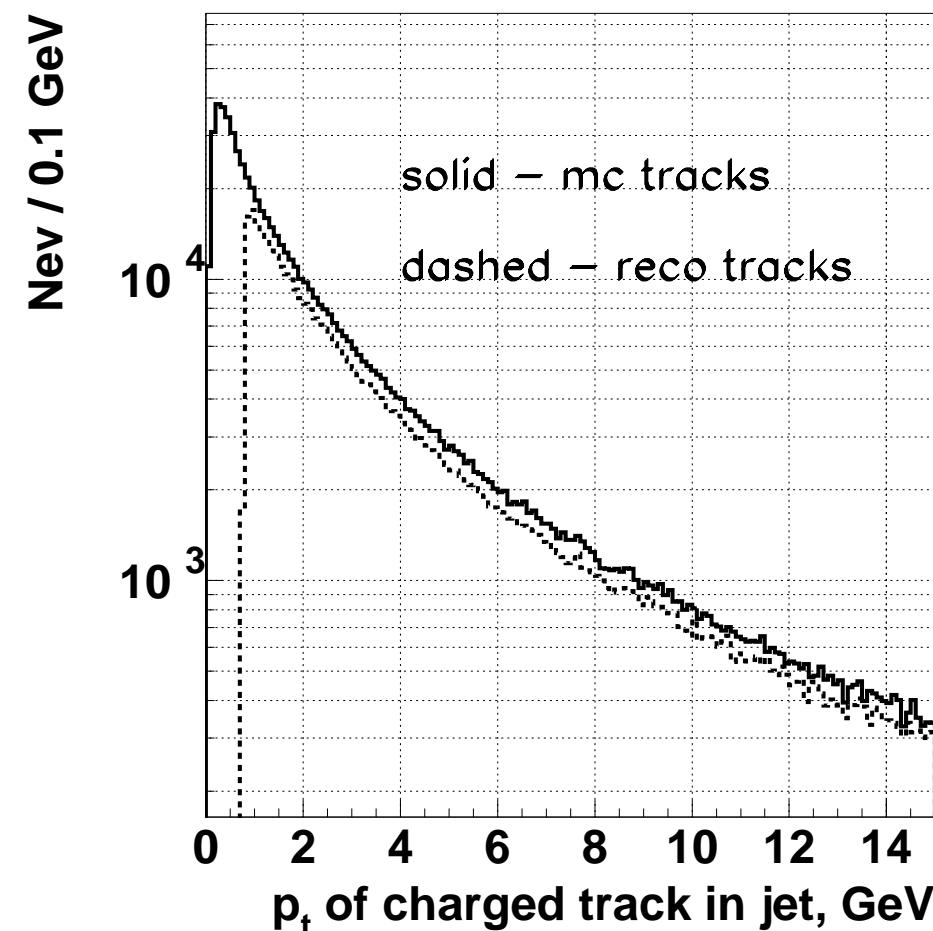
# Reconstructed tracks

on next plots I show results for

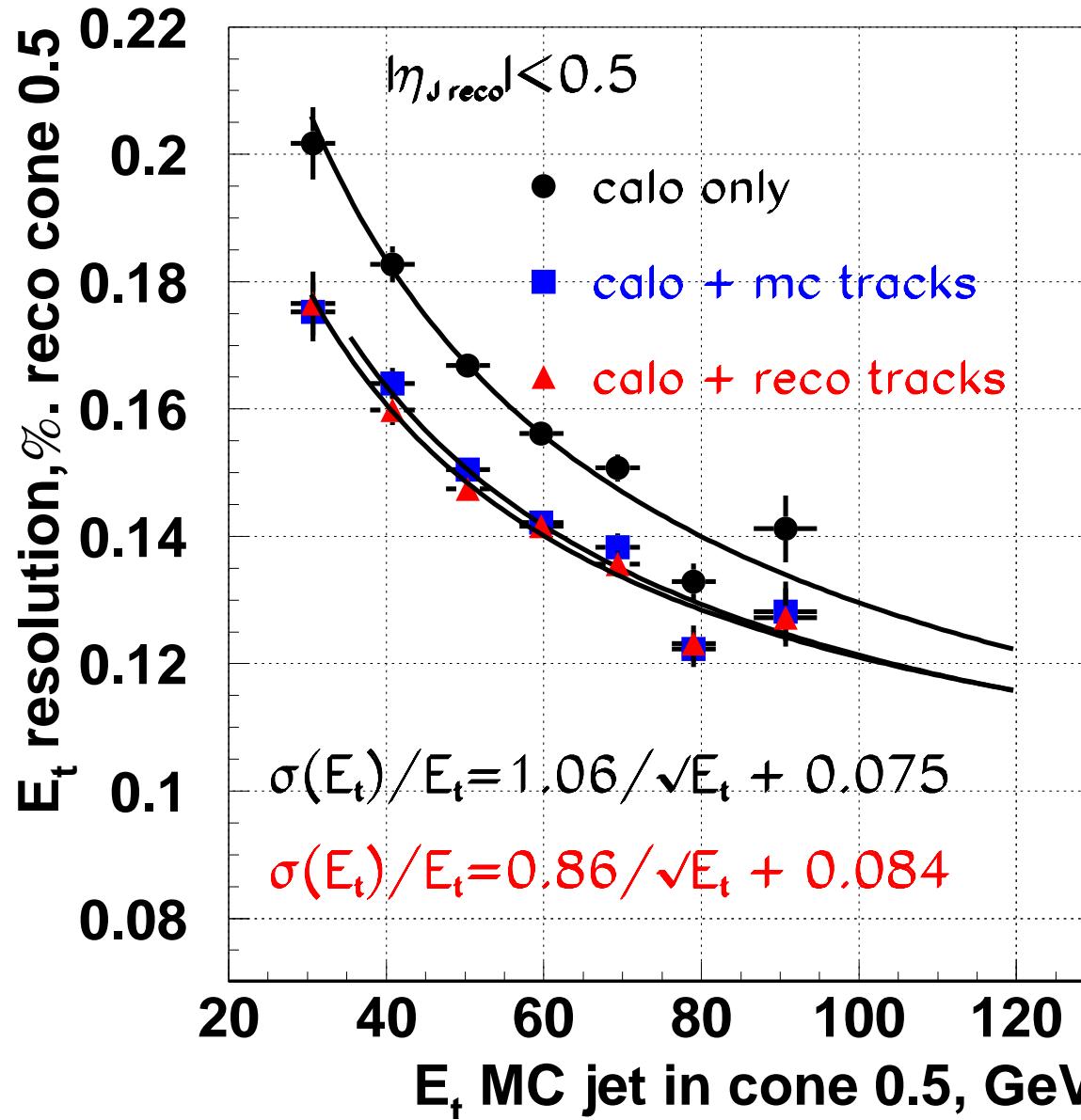
$$|\eta_{\text{Jet}}| < 0.5$$

$$1.0 < |\eta_{\text{Jet}}| < 1.5$$

$$1.5 < |\eta_{\text{Jet}}| < 2.2$$

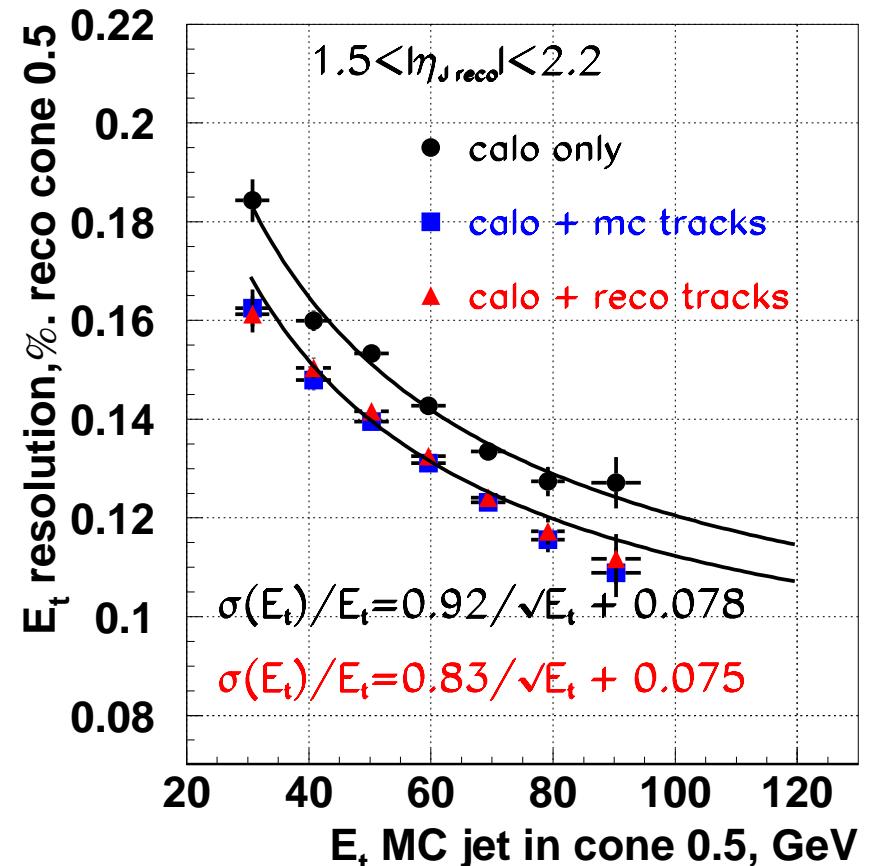
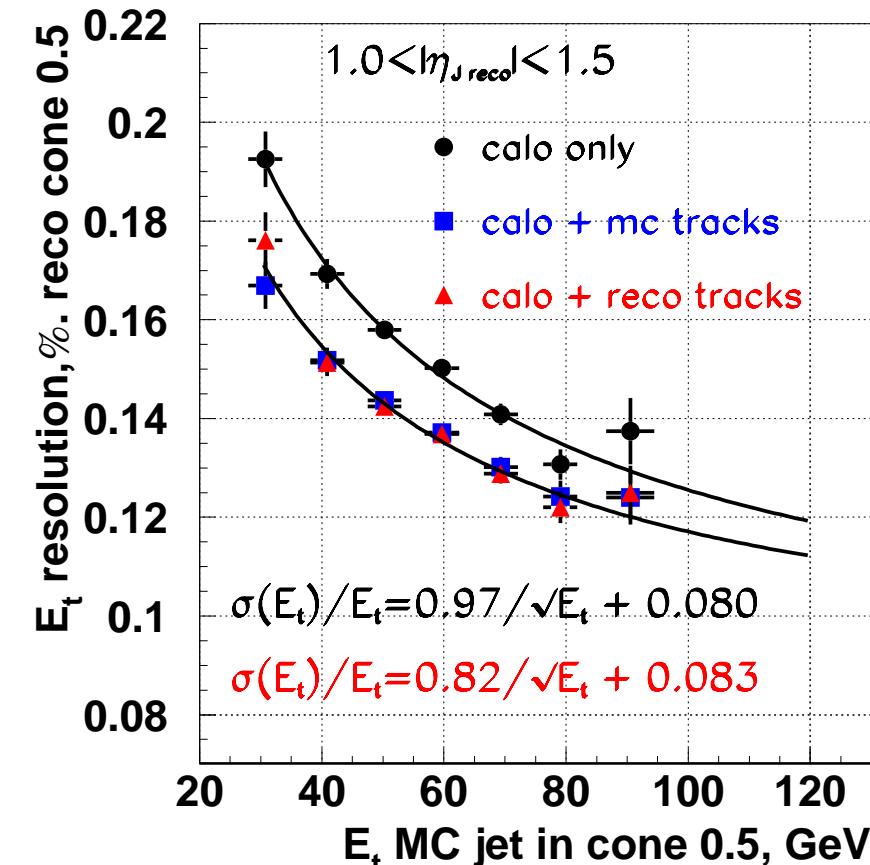


$|\eta_{\text{Jet}}| < 0.5$



with “realistic” simulation resolution is improved

$$1.0 < |\eta_{\text{Jet}}| < 1.5$$

$$1.5 < |\eta_{\text{Jet}}| < 2.2$$


more improvement in resolution for HB than for HE

next steps : add to My\_Jet class a method of adding out of cone tracks  
 HPW Jet Finders with known vertex (from Pixels)  
 energy flow algorithm (s) testing within ORCA